

Title: TWIST LID FOR INSULATED BEVERAGE CONTAINER

5

TECHNICAL FIELD

10 The invention relates to removable lids for beverage containers. More specifically, the invention relates to a selectively openable twist-type lid for an insulated beverage container.

BACKGROUND OF THE INVENTION

15 Thermally insulated beverage containers have become increasingly popular with the public for use with hot beverages, such as coffee. Containers of this type may also be used for cold beverages as well. Hot beverages, such as coffee and tea, impose the most demanding thermal requirements on such a container. As a result, consumers have come to appreciate that double walled, vacuum insulated containers perform this function best. Such containers have sidewalls often manufactured from metal, particularly stainless steel to withstand the high mechanical loading due to atmospheric pressure. Thermally insulated beverage containers designed for keeping cold beverages from becoming warm typically place a lower thermal load on the beverage container. As a result, such containers are often manufactured with a plastic double wall, wherein the interstitial space between the inner and outer walls is either thermally insulated with air or a foamed material.

25 In either case, it is highly desirable to provide a selectively openable lid for the beverage container. The lid performs at least two functions, the first of which is to prevent the beverage from spilling out of the container when the user is not actually drinking the beverage. This feature is particularly important when a hot beverage is

0 in the container so as to prevent the user from becoming
burned if the container tips over. As a second function,
the lip should provide for drinking the fluid at a
continual rate to prevent splashing or dribbling when the
beverage is being drunk from the container. The lids for
5 such containers are therefore typically provided with an
open position, a closed position, and a third position in
which the lid can be removed from the beverage container
for cleaning. An example of a travel mug having a three-
position, rotatable lid of the type described above is
10 disclosed in United States Patent No. 5,249,703 to Karp.
That patent discloses a travel mug having two inwardly
directly circumferential ears defining a gap region
therebetween. A rotatable lid, having radially directed
arms emanating from a central region at the bottom of the
15 lid are adapted to pass through the gaps in the ears, and
when rotated with the lid engage an underside of the
circumferential rim of the lid with the radially inward
directed ears. The rim is provided with diametrically
opposed apertures to permit fluid to egress from the mug
20 while air enters in through the remaining aperture to
equalize pressure within the mug. The disclosure of this
patent is incorporated herein by reference. One
particular problem with this prior art design is that the
drinking vessel must be specially manufactured with
25 dedicated structure to engage the arms of the lid. In
addition, although the lid is substantially splashproof
when the lid is in the closed position, it is not
leakproof if the mug is tipped over.

It has become increasingly common for users to employ
30 thermally insulated beverage containers, particularly of
the type best adapted for insulating hot beverages such as
coffee, in moving vehicles, such as automobiles. One
design branch in the prior art has attempted to provide a
lid for such containers which is easily operated by a
35 single hand between an open and closed position so that
the user does not inadvertently spill a hot beverage on

0 herself while driving her car. Lids of this type often
employ a push bottom mechanism having a normally closed
position. Examples of such prior art devices are shown in
the following patents: U.S. Patent No. 4,303,173 to
Nergard; U.S. Patent No. 3,964,631 to Albert; U.S. Patent
5 No. 3,967,748 to Albert; and U.S. Patent No. 4,099,642 to
Nergard. With respect to the lids disclosed in the above-
identified patents, the user typically depresses a button
near the rim of the lid to remove a stopper-like device
from an aperture in the lid. Releasing the button returns
10 the stopper to its normally closed position. Although
devices of this type perform their intended function well,
they have a significant unanticipated drawback.
Specifically, the position of a stopper in a normally
closed position provides an ideal breeding ground for
15 bacteria in the junction between the stopper and the lid
drinking aperture. In order to properly clean a lid of
this type which quickly becomes fouled with such bacterial
growth, the user must manually clean the lid by holding
the mechanism open while using a brush or the like. It
20 has been found that merely placing such lids in a
dishwasher or the like will not adequately clean the area
of contact between the stopper and the lid. Most users of
this type of device find the requirement to manually wash
the lid so inconvenient that they frequently will not
25 purchase a second product of the same design.

Therefore a need exists for a splashproof and
leakproof lid for an insulated beverage container which
provides a truly leakproof and spillproof design in both
an open and closed position, which does not encourage
30 bacterial growth between moveable parts of the lid, and
which is easily cleaned by the user.

SUMMARY OF THE INVENTION

35 It is therefore an object of the present invention to
provide a removable lid for an insulated beverage

0 container having leakproof and spillproof open and closed positions.

It s yet another object of the invention to provide the above-described object with a removable lid which does not encourage bacterial growth between moving parts of the
5 lid.

It is yet another object of the present invention to achieve the above objects in a removable lid which is easy to clean.

The invention achieves these objects, and other
10 objects and advantages which will become apparent from the description which follows, by providing a selectively openable lid for a drinking vessel having relatively rotatable base and cap members. Each member has drinking and venting apertures that are rotatably alignable with
15 respect to one another to form a first, closed position and a second, open position. Fluid seals between the base and cap member provide substantially leakproof fluid conduits between the respective venting and drinking apertures in the base and cap members when the members are
20 in the second, open position, and isolate interstitial areas between the members from the drinking and venting apertures in the base member when the members are in their first, closed position.

An alternate embodiment of the invention provides a
25 structure to delimit the relative rotation of the cap and base members to the first and second positions described above, as well as to a third position in which the cap and base members are disengagable so that they may be cleaned by immersion in a dishwasher or the like without the need
30 for an individual to physically maintain the members in a separate condition against spring pressure or the like. The lid can also be provided with a detent mechanism to discourage inadvertent relative rotation of the members from the second, open position to the third, disengaged
35 position. The base and cap members are preferably provided with corresponding bayonet ears for relative

0 rotational engagement therebetween. In addition, a rotational bearing in the form of a spindle and arbor can be provided to guide the relative rotation of the cap and base members.

5 The cap and base member can be provided with substantially any external geometric appearance, however a circular appearance is preferred to coincide with the substantially circular cross-sectional dimension of most beverage containers. In addition, the cap member is preferably provided with a depressed central region to
10 form a drinking basin for the user.

BRIEF DESCRIPTION OF THE DRAWINGS

15 Figure 1 is an isometric, perspective view of the selectively openable lid of the present invention in use with a generic drinking vessel.

Figure 2 is a top plan view of the lid in a closed position.

20 Figure 3 is a top plan view of the lid in an open position.

Figure 4 is an exploded, isometric view of base and cap members of the invention.

25 Figure 5 is a bottom plan view of the cap member of the invention.

Figure 6 is a top plan view of the base member of the invention.

Figure 7 is a cross-sectional, side elevational view of the lid taken along lines 7-7 of Figure 3.

30 Figure 8 is an enlarged, partial cross-sectional view of the circled area indicated in Figure 7.

0 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A three-position, selectively openable lid is generally indicated at reference numeral 10 for use with a thermally insulated beverage container 12, as shown in Figure 1. The lid 10 has substantially circular cap and base members, generally indicated at reference numerals 14 and 16 in Figures 4, 5 and 6. The cap and base members each have corresponding drinking apertures 18, 20 and venting apertures 22, 24. The cap and base members 14, 16 are relatively rotatably moveable with respect to one another from a first closed position shown in Figure 2, wherein the cap member drinking and venting apertures 18, 22 and the base member 16 drinking and venting apertures 22, 24 are out of respective registration with one another, to a second, open position shown in Figure 3 wherein the apertures are in registration with one another due to rotation of the cap and base members in a clockwise direction 26 of approximately 30 degrees. The cap and base members are also moveable to a third, disengaged position shown in Figure 4 by further rotating the cap member with respect to the base member in the clockwise direction an additional 30 degrees.

As will be apparent to those of ordinary skill in the art, when the lid 10 is in the first closed position shown in Figure 2, a user may not drink from the beverage container 12, whereas when the lid is in the second open position, shown in Figure 3, the user may drink from the beverage container 12. The user may also separate the cap and base members 14, 16, as shown in Figure 4, for cleaning, such as in a dishwasher.

The cap member 14 has an inwardly tapered and downwardly directly circular sidewall 30, defining a depressed drinking basin 32 having an upper surface 34 and a lower surface 36, defining the drinking and venting apertures 18, 22. The cap member 14 also has a downwardly depending external, circumferential flange 38, having a

0 knurled region 40 for grasping the cap member and rotating
the same with respect to the base member 16. As best seen
in Figures 4 and 5, the cap member sidewall 30 has on its
outer side diametrically opposed and laterally extending
bayonet ears 44, each subtending an angle of approximately
5 60 degrees. The lower surface 36 of the cap member also
supports a downwardly directed, cylindrical projection or
spindle 46, for guiding relative rotation of the cap and
base members 14, 16. The external flange 38 of the cap
member 14 supports a downwardly directed, arcuate
10 projection or timing cam 48 for limiting relative rotation
of the cap and base members 14, 16. The timing cam
subtends an angle of approximately 22.5 degrees.

As best seen in Figures 4, 6 and 7, the base member
16 has a substantially circular sidewall 52 having
15 external threads 54 adapted for mating with corresponding
threads (not shown) on an inside surface of the beverage
container 12. The sidewall 52 has, at an upper end
thereof, a circumferential rim 56 which supports an O-ring
58 on the underside of the rim for forming a fluid-tight
20 seal with the beverage container 12. The sidewall 52 also
defines a substantially flat, depressed floor region 60
which defines the drinking and venting apertures 20, 24.
An upper surface of the floor region also defines a
depressed central arbor 62 having sidewalls which form a
25 bearing surface for the spindle 46. The arbor, itself,
has a floor 64 to prevent fluid from the beverage
container from passing into the upper surface of the floor
region 60 other than through the drinking or venting
apertures 20, 24.

30 As best seen in Figures 4 and 6, the rim 56 of the
base member 16 also has first and second delimiting stop
members 66, 68 which project upwardly from the rim. The
stop members are separated by an angular distance of
approximately 145 degrees and form a receiving channel 70
35 for the timing cam projection 48. When the cap member 14
is rotated clockwise from the first closed position as

0 shown in Figure 2, through the second open position as
shown in Figure 3, to the third, disengaged position shown
in Figure 4, the timing cam 48 has its trailing edge 72
initially in contact with the second delimiting stop
member 68 until the timing cam's leading edge 74 comes
5 into contact with the first delimiting stop member 66. As
defined herein, the "leading edge" of a structural member
is defined as the surface which is first encountered when
the cap member 14 is rotated in a clockwise direction as
shown in Figures 1 through 3. The receiving channel 70 is
10 provided with a ramp-like detent structure 76 located
approximately one-third of the distance from the second
delimiting stop member 68 to the first delimiting stop
member 66. The detent structure 76 discourages
inadvertent rotation of the cap member 14 in a counter-
15 clockwise direction from the second open position to the
third, disengaged position unless the user imparts
sufficient torque to the cap member to resiliently deform
the timing cam 48 so that it may pass over the detent
structure 76.

20 In contrast to the symmetrical, diametrically opposed
bayonet ears 44 on the cap member 14, the base member 16
has first and second inwardly directed bayonet ears 80,
82 on an inner surface of the circular sidewall 52. The
leading edges 84, 86 of the bayonet ears 80, 82 are
25 diametrically opposed with respect to the center of arbor
62. However, the first bayonet ear 80 subtends an angle
of approximately 60 degrees, whereas the second bayonet
ear 86 subtends an angle of approximately 30 degrees.
Thus, the trailing edges 88, 90 are not diametrically
30 opposed. This asymmetrical structure permits the cap
member 14 to be released from the base member 16 when the
timing cam leading edge 72 is in contact with the first
delimiting stop member 66.

As best seen in Figures 6 and 8, the base member 16
35 is provided with a venting aperture seal 100 and a
drinking aperture seal 110. The seals are preferably

0 manufactured from food grade silicon or rubber and are in
the shape of an arcuately deformed figure-8. One portion
of the figure-8 portion of each seal circumscribes the
respective drinking or venting aperture. The remaining
5 areas 112, 114 of the floor region 60 of the base member
16. As will be apparent to those of ordinary skill in the
art, when the cap and base members 14, 16 are in the
first, closed position as shown in Figure 2, the drinking
and venting apertures 20, 24 of the base member 16 are in
10 registration with the smooth, lower surface 36 of the cap
member 14, which are surrounded by portions of the figure-
8 shaped seals 100, 110. Thus, the lower surface 36 of
the cap member 14 and substantially all of the floor
region 60 of the base member 16 remain uncontaminated by
15 fluid from the drinking vessel 12. Similarly, when the
cap and base members 14, 16 are in the second, open
position shown in Figure 3, the drinking and venting
apertures 18, 20 and 22, 24 are in registration and also
surrounded by closed portions of the seals 100, 110.
20 Thus, the lower surface 36 and floor region 60 also remain
uncontaminated by fluid in the beverage container 12 when
a user is drinking therefrom. The assignee of the present
invention has discovered that by fluidly isolating the
drinking and venting apertures from the remaining
25 structure of the lid 10, the lid remains substantially
sanitary for much longer periods of time as compared to
prior art designs. Eventually, when it is necessary to
clean the respective parts of the lid, the user can easily
disassemble the lid as shown in Figure 4 and place the
30 parts in a dishwasher or the like for cleaning and
sanitization.

In view of the above, the cap and base members 14, 16
are preferably manufactured from a food grade thermo-
plastic elastomer such as acrylonitrile butadiene styrene
35 (ABS) or another suitable injection molded polymer. The
seals 100, 110 and the O-ring 58 are preferably

0 manufactured from food grade silicon, rubber or another
suitable material. The knurled region 40 is preferably a
rubberized material adhered to or ultrasonically welded
onto the external flange 38.

Another feature of the invention is disclosed in
5 Figure 8. The invention provides for gradual release of
pressure when the lid 10 is rotated from the closed to
open position. Such pressure may undesirably form inside
the drinking vessel 12 when there is a drop in ambient
temperature while the lid is in the closed position and a
10 hot beverage is stored in the vessel. If the vessel is
full, some of the fluid may be undesirably ejected from
the venting aperture 22. To provide a circuitous path for
release of such pressure, the venting aperture 22 is
provided with a lower, arcuate depression or rebate 120.
15 The rebate has a depth of approximately one-half of the
thickness of the drinking basin 32 and has a length of
approximately one-quarter inch. As best seen in Figure 6,
the rebate 120 and venting aperture 22 are preferably
totally circumscribed by the portion of seal 100 which
20 encloses empty area 112 when the lid 10 is in the closed
position. When the lid is rotated towards the open
position from the closed position, the rebate 120 clears
the empty area 112 sealed venting aperture seal 100 first.
This provides a small, indirect venting pathway from
25 inside the vessel 12 to outside of the vessel to gently
release any such pressure.

Other alternate embodiments of the invention are
contemplated which will be apparent to those of ordinary
skill in the art upon reviewing the above disclosure. For
30 example, the seals 110, 112 can be placed on the lower
surface 36 of the drinking basin 32 while the floor region
60 of the base member 16 can be made substantially smooth.
In addition, the orientation of the bayonet ears described
above can be reversed with the symmetrical bayonet ears
35 being positioned on the base member 16, and the
asymmetrical bayonet ears being placed on the cap member

- 0 14. The timing arrangements of the stop members 66, 68,
timing cam 48, and relative positions of the drinking and
venting apertures can all be rearranged in accordance with
the design choice of those of ordinary skill in the art
in accordance with the concepts of the invention as
5 discussed above. Therefore, the invention is not to be
limited by the above disclosure but is to be determined in
scope by the claims which follow.